DOCUMENT RESUME

ED 086 524 SE 017 124

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TITLE	Prehistoric Life, Science (Experimental): 5311.15.
INSTITUTION	Dade County Public Schools, Miami, Fla.
PUB DATE	72
NOTE	21p.; An Authorized Course of Instruction for the Quinmester Program
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Behavioral Objectives; Biology; *Curriculum Guides; *Earth Science; Geology; *Instructional Materials; *Junior High School Students; Science Education; Secondary School Science
IDENTIFIERS	*Quinmester Program

ABSTRACT

Presented is a survey course of the biological and geological history of the earth which includes: (1) theories of the formation of the earth, (2) theories of the formation of life, (3) geological eras (calendar), (4) fossil formation and fossil fuels, and (5) modern-day research. This course is intended for junior high level and no previous courses are required as indicators of student success. Three state-adopted texts are listed: Silver Burdett's "Earth Science," Houghton Mifflin's "Investigating the Earth," and Allyn and Bacon's "Exploring Earth Science." Eight performance objectives are stated. Experiments, drawn from several texts, are suggested as well as 14 individual student projects. A list of student reports, some meaningful field trips and a number of suggested guest speakers are recommended. Films, film loops, cassette tapes, film strips, transparencies, slides and models relevant to the course of study are cited, as well as suggested dicsussion questions. A complete reference list is also included in the syllabus along with a master sheet coordinating the course of instruction. (Author/EB)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

PREHISTORIC LIFE

5311.15
5312.15
5313.15

SCIENCE

(Experimental)

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION • 1971

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SCIENCE

(Experimental)

Written by Lois Jenks
for the
DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida
1972

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Published by the Dade County School Board

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PREHISTORIC LIFE

COURSE DESCRIPTION

A survey course of the geological and biological history of the earth to include the following:

a. theories of the formation of the earth
b. theories of the formation of life
c. geological eras (calendar)
d. fossil formation and fossil fuels
e. modern day research

ENROLLMENT GUIDELINES

No previous science courses are required as indicators of student success. This course is to be an elective for junior high.

STATE ADOPTED TEXTS

Brown, F. Martin; Kemper, Grace; and Lewis, John H. Earth Science. Morristown, New Jersey: Silver Burdett Company, 1970.

Earth Science Curriculum Project. Investigating the Earth. Boston: Houghton Mifflin Company, 1967.

Kilburn, Robert and Thurber, Walter. Exploring Earth Science. Boston: Allyn and Bacon, Inc., 1970.

PERFORMANCE OBJECTIVES

1. The student will discuss critically selected theories pertaining to the formation of the earth.

2. Given the opportunity to study the complex chain of cell life, the student will formulate a hypothesis as to the theory of the formation of life.

3. Given the six major geological eras, the student will infer the type of plant and/or animal life particular to each.

4. Given a collection of pictures of animals and plants that have completely disappeared from the earth, the student will propose reasons why these plants and animals became extinct.

5. Given a set of pictures of selected plants and animals (possible examples include earthworm, one-celled animal, frog, fish, clam, bird, fern, moss, rose and whale), the student will assemble these pictures in the order in which plants and animals appeared on the earth.

6. The student will trace selected eras in terms of evolutionary processes up to man's creation.

7. The student will suggest various important reasons for the study of fossils.

8. The student will differentiate between selected modern techniques for studying fossils.

COURSE OUTLINE

I. Theories of the Formation of Earth

A. Nebular hypothesis

B. Planetary hypothesis

C. Dust cloud hypothesis

II. Theories of the Formation of Life

A. Amino acid generation

1. Action of lightning upon ancient oceans
2. Ultraviolet radiation of water-soluble gases

B. Planetary transplants (fossiliferous meteorites)

III. The Geological Time Scale

A. Cryptozoic eon (embraces 80% of geological time)

1. Eozoic (azoic) era
2. Archeozoic era
3. Proterozoic era

B. Phanerozoic eon

1. Palaeozoic era

a. Cambrian period
b. Ordovician period
c. Silurian period
d. Devonian period
e. Carboniferous period

(1) Mississippian period
(2) Pennsylvanian period

2. Mesozoic era

a. Triassic period
b. Jurassic period
c. Cretaceous period

3. Cenozoic era

a. Tertiary period

(1) Palaeocene epoch
(2) Eocene epoch
(3) Oligocene epoch
(4) Miocene epoch
(5) Pliocene epoch

b. Quaternary period

(1) Pleistocene epoch
(2) Recent or holocene epoch

IV. Prehistoric Life Forms

A. Plant characteristics

B. Animal characteristics

C. Plant adaptations

D. Animal adaptations

E. Predilection of species

1. Extinction
2. Survival

F. Man's emergence

V. Fossils

A. Formation

1. Replacement
2. Natural molds and casts
3. Distillation
4. Impressions
5. Permineralization
6. Freezing
7. Mummification (dessication)
8. Imbedding in resin (amber)

B. Sources

C. How found

1. Mining and excavations, ploughing
2. Erosion of land by water, wind and ice
3. Systematic searching by paleontologists

D. Methods of collection

E. Techniques of cleaning and displaying

F. Classification

G. Uses

1. As evidence of evolution
2. Fuels

a. Peat
b. Lignite (brown coal)
c. Bituminous (soft coal)
d. Anthracite (hard coal)
e. Oil

3. Diatoms as abrasives and filtering agents

4. Pinpoint locations and boundaries of continents in past ages

VI. Modern Day Research

A. Radioactive dating

1. Carbon
2. Uranium
3. Potassium
4. Thorium
5. Rubidium

B. Flame photometry

C. Spectroscopy

D. X-rays

E. Pollen grains

F. Uranium, flourine, and nitrogen percentages in bones

EXPERIMENTS

Bishop, Bronaugh, and Lewis. Focus on Earth Science. Columbus, Ohio: Charles E. Merrill Publishing Co., 1969.

1. Impressions (p. 380)
2. Molds and casts (p. 380)
3. Carbon impressions (p. 381)
4. Fossil comparisons (p. 412)
5. Boraxed plant life (p. 412)
6. Vegetation collection (p. 412)

Biss and Hibbs. The Earth-Space Sciences. River Forest, Illinois: Laidlaw Brothers, 1969.

7. Soil settling (p. 379)
8. Geologic time scale segments (p. 379)

Heimler and Neal. Principles of Science: Book Two. Columbus, Ohio: Charles E. Merrill Books, Inc., 1966.

9. Specific gravity of petrified wood (p. 142)

Kilburn and Thurber. Exploring Earth Science. Boston: Allyn and Bacon, Inc., 1970.

10. Inferences from animal tracks (p. 147)

PROJECTS

1. Reconstruct an animal skeleton
2. Using plants found today (ferns, club mosses, etc.), reconstruct a Coal Age garden
3. Prepare a plant and animal exhibit showing different fossilisation processes
4. Imbed insects in clear plastic resin
5. Assemble a display of fossil fuels
6. Diagram (with drawings and/or pictures) the sequence of vertebrate development
7. Construct scale models comparing the relative sizes of man and prehistoric animals
8. Using models and pictures, assemble a display that compares prehistoric animals and plants with those found today
9. Using models, reconstruct the living habitat of the cave men
10. Using materials found naturally in your locality, construct tools similar to those used by cave men
11. Prepare a diorama to represent the life of one specific prehistoric period
12. Make a fossil collection, identifying each fossil
13. Make plaster casts of animal tracks and inanimate objects
14. Make a scale model of the Grand Canyon

REPORTS

1. Ancient horses
2. How to collect fossils
3. Fuels from fossils
4. Evolution of plants
5. Evolution of animals
6. Man's ancestors
7. Natural history of Florida
8. Extinct animals (sabertooth tiger, etc.)
9. Animals threatened with extinction
10. Fossil dating
11. Dinosaurs
12. Prehistoric insects
13. Prehistoric birds
14. Prehistoric reptiles
15. Prehistoric fish
16. Prehistoric mammals
17. Stone age tools
18. La Brea tar pits

FIELD TRIPS

1. Museum of Science-Planetarium
   3280 South Miami Avenue

2. Bear Cut (fossilized mangrove reef)
   Key Biscayne

3. Vizcaya, Dade County Art Museum (marine fossil imprints in limestone)
   3251 South Miami Avenue

SPEAKERS

1. University of Miami
   Department of Anthropology
   1217 Dickinson Drive, Coral Gables

2. University of Miami
   Department of Geology
   Science Building

3. Miami-Dade Junior College, North Campus
   Department of Earth Science

4. Miami-Dade Junior College, South Campus
   Department of Earth Science

5. Museum of Science-Planetarium
   3280 South Miami Avenue

DADE COUNTY 16 mm. FILMS

1. Adaptations in Plants
AV#1-11107, 15', C

2. Adaptations of Plants and Animals
AV#1-11059, 13', C

3. Animals of Prehistoric America
AV#1-11028, 15', C

4. Archeologists at Work
AV#1-11036, 14', C

5. Birth of a Florida Key
AV#1-12251, 18', C

6. The Dinosaur Age
AV#1-11024, 14', C

7. Dinosaurs
AV#1-30673, 28', C BW

8. The Earth in Evolution
AV#1-01994, 11', C

9. Evidence for the Ice Age
AV#1-10969, 19', C

10. Evolution of Man
AV#1-30389, 28', C BW

11. Fossils Are Interesting
AV#1-02167, 11', C

12. Fossils: Clues to Prehistoric Times
AV#1-02161, 11', C

13. The Fossil Story
AV#1-13223, 19', C

14. From Ice to Life
AV#1-02015, 11', C

15. Fuels: Their Nature and Use
AV#1-01862, 11', BW

16. Horses and Their Ancestors
AV#1-11507, 12', C

17. How Living Things Change
AV#1-02221, 11', C BW

18. In the Beginning
AV#1-30356, 28', C

19. Parade of Ancient Life
AV#1-11016, 15', C

20. Prehistoric Animals of the Tar Pits
AV#1-11032, 14', C

21. Prehistoric Times: The World Before Man
AV#1-01992, 10', C

22. Shape of the Earth
AV#1-30221, 29', C

23. This Vital Earth
AV#1-02178, 10', C

FILM LOOPS

Educational Reading Service
1. Discovering Fossils

Walt Disney
2. Dinosaurs: Meat Eaters
3. Dinosaurs: Plant Eaters

CASSETTE TAPES

Educational Reading Service: Prehistoric Animals

FILMSTRIPS

Available from Encyclopedia Britannica

1. Fossils, Part I
   How Fossils Are Formed

2. Fossils, Part II
   Collecting and Interpreting Fossils

3. Fossils, Part III
   Fossils and the Relative Ages of Rocks

4. Fossils, Part IV
   Fossils and Prehistoric Environments

5. Fossils, Part V
   Fossils and Organic Change

Available from Life

6. The World We Live In, Part I
   The Earth Is Born

7. The World We Live In, Part VI
   The Age of Mammals

8. The World We Live In, Part V
   Reptiles Inherit the Earth

Available from Modern Biology

9. Evolution, Part I
   Theories Past and Present

10. Evolution, Part II
    Abiogenesis vs. Biogenesis

11. Evolution, Part III
    Geologic Time

12. Evolution, Part IV
    How Structures Evolve

13. Evolution, Part V
    From Fish to Primate

14. Evolution, Part VI
    Supporting Evidence

DADE COUNTY TRANSPARENCIES

		AV#	
1.	North America during the Tertiary Period	2-00312	C
2.	Key to Rock Types	2-00315	C
3.	North America during the Cambrian Period	2-00269	C
4.	North America during the Cretaceous Period	2-00311	C
5.	North America during the Devonian Period	2-00305	C
6.	North America during the Jurassic Period	2-00310	C
7.	North America during the Mississippian Period	2-00306	C
8.	North America during the Ordovician Period	2-00303	C
9.	North America during the Pennsylvanian Period	2-00307	C
10.	North America during the Permian Period	2-00308	C
11.	North America during the Quaternary Period	2-00313	C
12.	North America during the Silurian Period	2-00304	C
13.	North America during the Triassic Period	2-00309	C
14.	Geologic Time Scale	2-00314	C

MacMillan Audio-Visual Transparencies, Proofs of Development and Evolution Series

15. Comparison of Vertebrate and Insect Legs
16. Evolution of the Horse's Hoof
17. Proofs Based on Embryonic Development
18. Transitional Forms between Fossils and Living Forms

DADE COUNTY SLIDES

		AV#	
1.	Fossil Invertebrates	5-21027	C
2.	Fossil Vertebrates	5-21026	C
3.	Neolithic Art	5-20125	C
4.	Paleolithic Cave Painting	5-20121	C
5.	Stone Age Sanctuary at Lascaux	5-20123	C
6.	Stone Age Tools	5-20122	C

DADE COUNTY MODELS

		AV#
1.	Age of Dinosaurs (13 specimens)	6-00051
2.	Biorama: Development of Life through the Ages	6-00164
3.	Fossil Collection (Shells and Rocks)	6-00114
4.	Prehistoric Figure Set	6-00113
5.	Story of Rocks	6-00128

SUGGESTED DISCUSSION QUESTIONS

1. Why is a fossil found in a low layer of sedimentary rocks considered to be older than a fossil in a higher layer?

2. Why do geologists show plants in restorations as being green?

3. What inferences can a geologist make from the teeth of a fossil?

4. How does a geologist decide upon the type of covering to use for a model of an animal for which only a skeleton is known?

5. Why do only a few organisms become fossils after death?

6. Why is coal called petrified sunshine?

7. Why would changes in climate have a greater effect on land life than on marine life?

8. How can the one-billion year difference between the age of the oldest meteorites and the oldest rocks dated thus far from the earth's crust be explained?

9. Why might fossils of human beings be considered good index fossils by geologists millions of years from now?

10. If evolutionary development has usually progressed from the simple to the complex, why are any simple forms left?

11. What validity might the following statement have: the first bird hatched from an egg laid by a reptile.

12. What factors may have caused the rate of salt accumulation in the ocean to vary through the ages?

13. Why are the oldest rocks dated thus far probably not the oldest rocks on earth?

REFERENCES

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14. Ordway, Richard. Earth Science. Princeton, New Jersey: D. Van Nostrand Co., Inc., 1966.

15. Shourd, Melvin and Wegenek, Leonard. Fossils: A Student Reference Book. St. Louis: McGraw Hill Book Company, 1969.

16. Simak, Clifford. Trilobite, Dinosaur and Man. New York: St. Martin's Press, 1966.

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18. Wendt, Herbert. Before the Deluge. New York: Doubleday and Co., Inc., 1968.

MASTER SHEET--PREHISTORIC LIFE

Objectives	Laboratory Experiments	Student Text	Supplementary References	Films	Film Loops	Film Strips	Trans-parencies	Slides	Cassettes	Models
1	7	pp. 3,6, 11	5,7,16,17	5,8,11,13,16, 22		6				
2		pp. 3,6, 11	1,14	11,12,14		10,12,14				
3	1,2,3,8,10	pp. 3,6, 11	8,13,14	3,16,19,21,23	2,3	11	1-14	1,2	1	1,4
4	1,4	pp. 3,6, 11	2,4,12	1,2,6,7	2,3	1			1	1
5	4,5,6	pp. 3,6, 11	8,10,13	3,16,21,23	2,3	7,8			1	
6	8,9	pp. 3,6, 11	4,14,18	6,9,10,16,17, 19,20		3,9,11, 14	15-18	3,4,5,6		2
7	4	pp. 3,6, 11	9,15	3,4,6,15		4,5		1,2		3,5
8	1,2,10	pp. 3,6, 11	15	4,6,19,20		2				